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Topobates helveticus sp. n. and some other remarkable moss mites from Switzerland (Acari: Oribatida).

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***Topobates helveticus* sp. n. and some other remarkable moss mites from Switzerland (Acari: Oribatida). -** The description of a new *Topobates* species, *T. helveticus*, and an overview of the genus *Topobates* Grandjean, 1958 with a key to the European *Topobates* species, are given. Taxonomical and morphological notes on three futher rare or little known oribatids (*Miracarus similis* Subías & Iturrondobeitia, 1978, *Lamellocepheus personatus* (Berlese, 1910), with their relationships, and *Jugatala angulata* (C. L. Koch, 1839) from Switzerland are added. 19 figures are presented.

Keywords: Mites - new and rare species - description - redescription - identification keys.

INTRODUCTION

In continuing our study of oribatids of Switzerland (e.g. Mahunka and Mahunka-Papp, 2003), we now examine some little known species belonging to different families. Among them we found a new species of the genus *Topobates* Grandjean, 1958 and three other, rare or little known species as *Lamellocepheus personatus* (Berlese, 1910), *Miracarus similis* Subías & Iturrondobeitia, 1978 and *Jugatala angulata* (C. L. Koch, 1839). These species have not been recorded until now from Switzerland.

The first thorough revision of the genus *Topobates* was completed by Weigmann & Miko (1998). However, they discussed mainly the European species, with the exception of some species of the genus *Setobates* Balogh, 1961 (in the synonym of *Topobates*). Their conclusions, both in the evaluation of the morphological characteristic and in the analysis of the degree of relationships, are probably correct. The only debatable fact is whether *Topobates* is a subgenus of *Scheloribates* Berlese, 1908, or an independent genus. The latter view was supported by Subías (2004), in his catalogue, who accepted the genus as independent. In accordance with other authors, he relegated the listed species here, and a further synonym (*Flagellobates* Mahunka, 1978) was also established, most likely correctly, in this group.

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Thus the known distribution of the genus *Topobates* has become much enlarged. Subías considers it to be cosmopolitan, but even his own data do not confirm this opinion. However, it can be stated that the species known so far (except for *T. holsaticus* Weigmann, 1969) have a small range, because all of them have been collected at one or two localities only. This holds true also for the species of Switzerland. Together with the recently discovered new species, two *Topobates* species are currently known from the territory of Switzerland. I agree with Subías in placing also *Hemileius umbraili* Schweizer, 1956 in the genus *Topobates*.

Regarding the other three species not previously known from Switzerland, *Miracarus similis* is known from Spain and France, while *Lamellocepheus personatus* so far only from South and East Europe, and *Jugatala angulata* from the montane regions of Europe. All three species are rare.

MATERIAL AND METHODS

As far as the terminology in describing the new species is concerned, we heavily relied upon the work of Weigmann (2006), Weigmann & Miko (1998) and Grandjean (1936, 1962).

All material examined is deposited in the Muséum d'histoire naturelle de Genève (MHNG) and in the Hungarian Natural History Museum, Budapest (HNHM).

DESCRIPTION OF THE NEW SPECIES AND COMPLEMENTARY DESCRIPTIONS OF SOME OTHER ORIBATIDS

Family Scheloribathidae Jacot, 1935

Topobates helveticus sp. n. Figs 1-3

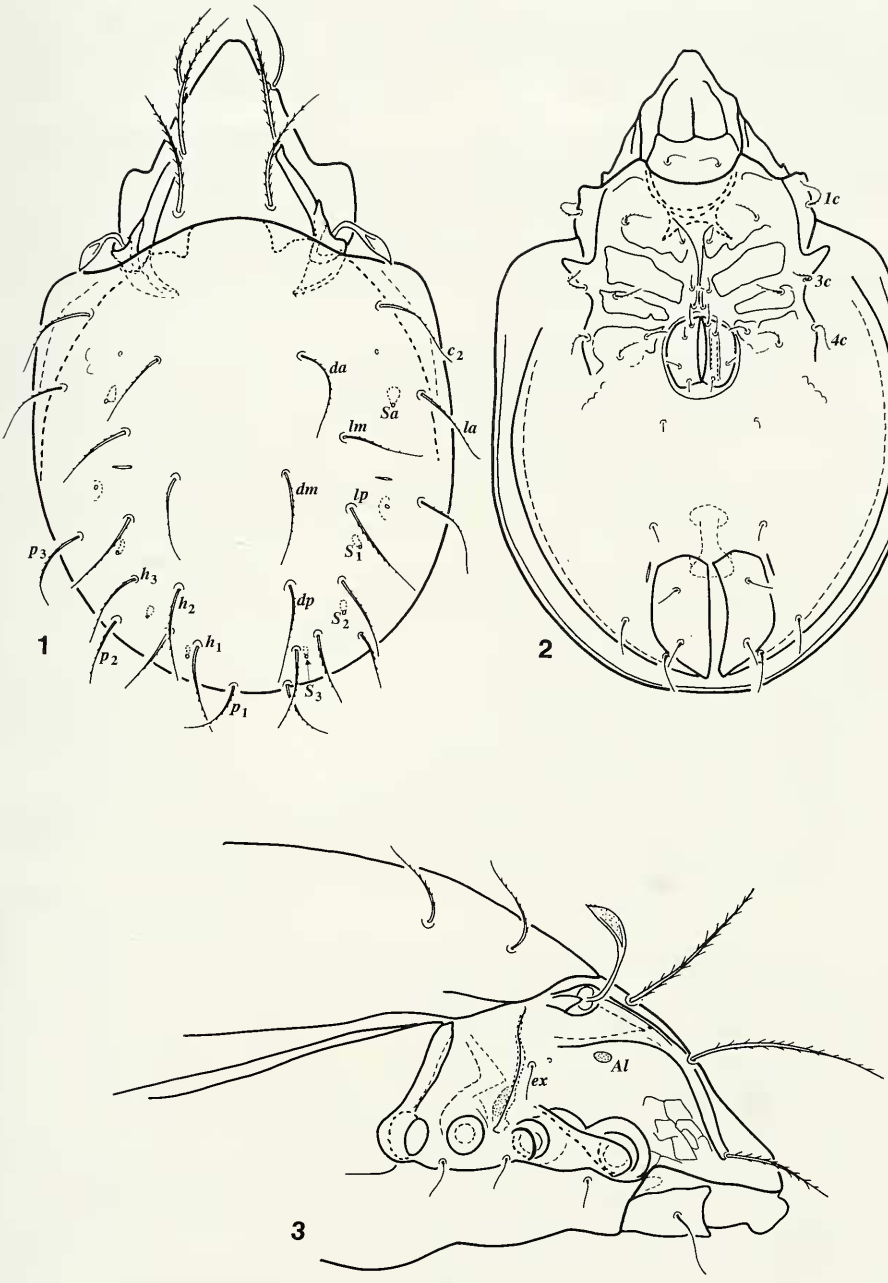
Material examined: Holotype: **VS-11**: Switzerland: Valais: Grammont, sifting of mosses, 2000 m; 30.VI.1989; leg. C. Besuchet. – 1 paratype from the same sample. Holotype deposited in MHNG, paratype (1708-P0-05) in HNHM.

Etymology: The species is named after the country of its origin.

Diagnosis: Typical scheloribatoid species. Rostral apex obtuse, lamella, sublamella and prelamella present. Prodorsal setae long and strong, distinctly ciliate. Head of sensillus clavate and foveolate, directed outwards and backwards. Dorsosejugal suture gradually convex. Thirteen pairs of simple, rarely pilose and long notogastral setae, four pairs of small sacculi observable. Epimeral setal formula: 3-1-3-3, anogenital setal formula: 4-1-2-3, all simple, short.

Measurements: Length of body: 464-503 μm, width of body: 295-302 μm.

Description: *Prodorsum*: Apical part of rostrum triangular, rostral apex obtuse. Whole surface of notogaster finely punctate. Lamellar complex well developed, lamella, sublamella strong, reaching the lamellar setae, prelamella slightly thinner (Fig. 1). All prodorsal setae comparatively long, distinctly pilose, their ratio: *le* = in > *ro* > *ex*. Peduncle of sensillus short, curved, its head small, asymmetric, with some very small spicules on its distal margin.



FIGS 1-3

Topobates helveticus sp. n. (1) Body in dorsal view. (2) Body in ventral view. (3) Podosoma in lateral view.

Notogaster: Dorsosejugal suture distinct, convex, pteromorphae small, blade-like. Whole surface finely punctate. Thirteen pairs of simple, distinctly and finely barbed, long notogastral setae and four pairs of small sacculi present, *Sa* slightly larger than the others.

Lateral part of podosoma: Sublamellar area porosa small. Lateral region under prelamella ornamented with weak polygonal pattern (Fig. 3). Pedotecta 1 narrow.

Ventral parts: Surface of infracapitulum, epimeral and ventral plates nearly smooth. Epimeral fields well framed laterally and medially (Fig. 2). Discidium weakly developed, not protruding. All ventral parts with the usual numbers of setae, i.e. epimeral setal formula: 3 – 1 – 3 – 3, anogenital setal formula 4 – 1 – 2 – 3. Except for setae ad_1 and ad_2, all others short and simple.

Legs: All legs tridactylous and heterodactylous.

Remarks: The new species is well characterised by the thirteen pairs of very long notogastral setae and by the finely punctate notogastral sculpture. On this ground it stands nearest to *T. comatus* (Pérez-Iñigo, Herrero & Pérez-Iñigo, 1987).

Thus, the currently known European *Topobates*-fauna comprises eight species. On the basis of their main characters (length of notogastral setae, number of notogastral setae and sculpture of notogaster), they can be arranged into three groups. Weigmann & Miko (1998) compiled an identification key for the previously known species, we here add the two Swiss species *T. umbraili* and *T. helveticus* sp. n.

Key to European Topobates species

1a Surface of notogaster granular . . . . . *granifer* Grandjean, 1958
1b Surface of notogaster smooth, or finely punctate 2
2a Twelve pairs of notogastral setae present . . . . . *carpathicus* Weigmann & Miko, 1998
2b Thirteen or fourteen pairs of notogastral setae present 3
3a Fourteen pairs of notogastral setae and five pairs of sacculi present . . . . . *alvaradoi* Pérez-Iñigo, 1969
3b Thirteen pairs of notogastral setae and four pairs of sacculi present 4
4a Notogastral setae long, distance between the insertion of *dm* and *dp* about as long as the length of setae *dm* 5
4b Notogastral setae short, distance between the insertion of *dm* and *dp* much longer than the length of setae *dm* 6
5a Interlamellar setae very long, reaching far over the rostral cusp. Setae *dp* much longer than the distance between setae *dm* and *dp* . . . . . *comatus* (Pérez-Iñigo, Herrero & Pérez-Iñigo, 1987)
5b Interlamellar setae ending far from the rostral cusp. Setae *dp* shorter than the distance between setae *dm* and *dp* . . . . . *helveticus* sp. n.
6a Sensillus long, reaching lateral margin of pteromorphae . . . . . *umbraili* (Schweizer, 1956)
6b Sensillus short, not reaching lateral margin of pteromorphae 7
7a Notogaster with a semicircular band running parallel to margin of body. Setae c_2 shorter than posterior notogastral setae . . . . . *circumcarinatus* Weigmann & Miko, 1998

7b No semicircular band on notogaster. Setae c_2 not shorter than posterior notogastral setae . . . . . *holsaticus* Weigmann, 1969

Family Microzetidae Grandjean, 1936

Miracarus similis Subías & Iturrondobeitia, 1978 Figs 4-8

Locality: **VS-48**: Switzerland: Valais: Vouvry, layer of mosses from a rocky slope on the trail to the cave „Grotte de la Pierre Perret" (B), 460 m; 10.VIII.1989; leg. B. Hauser.

Remarks: The genus *Miracarus* Kunst, 1959 so far comprises five species, all from the Mediterranean region of Europe. However, according to Subias (2004, 2008), *M. abeloosi* Lions, 1979 is conspecific with the above species, therefore the genus would have only four species. As far as we are concerned, the synonymy of *similis* and *abeloosi* needs further proof, also because Pérez-Iñigo (1997) made no mention of this opinion. By comparing the published figures of the two species, significant differences can be established, although the figure of *similis* is highly simplified, and we do not know whether the authors have studied the types of both species.

The lamellar apices of *M. similis* described from Arratia (Viczaya) are very wide and touching each other medially. A well-developed sejugal line is present, which is not interrupted medially. *M. abeloosi* was described by Lions (1979) from specimens collected in France, in the region of "Alpes Maritimes", in the environs of "Le Chens" and "Sainte Baume". His description is perfect, covering all the details, but differs from the original description of *M. similis*. The Swiss specimens, the figures of which are given hereunder (Figs 4-8), may be conspecific with the ones from France. The shape of the lamellar apices in the Swiss specimens is different, and the dorsosejugal line is clearly interrupted.

The known localities in France are quite close to those of the Swiss specimens, therefore it is not surprising that they belong to the same species. We accept the opinion of Subías, with the reservation that a further study of the types is necessary.

Key to the species of *Miracarus*

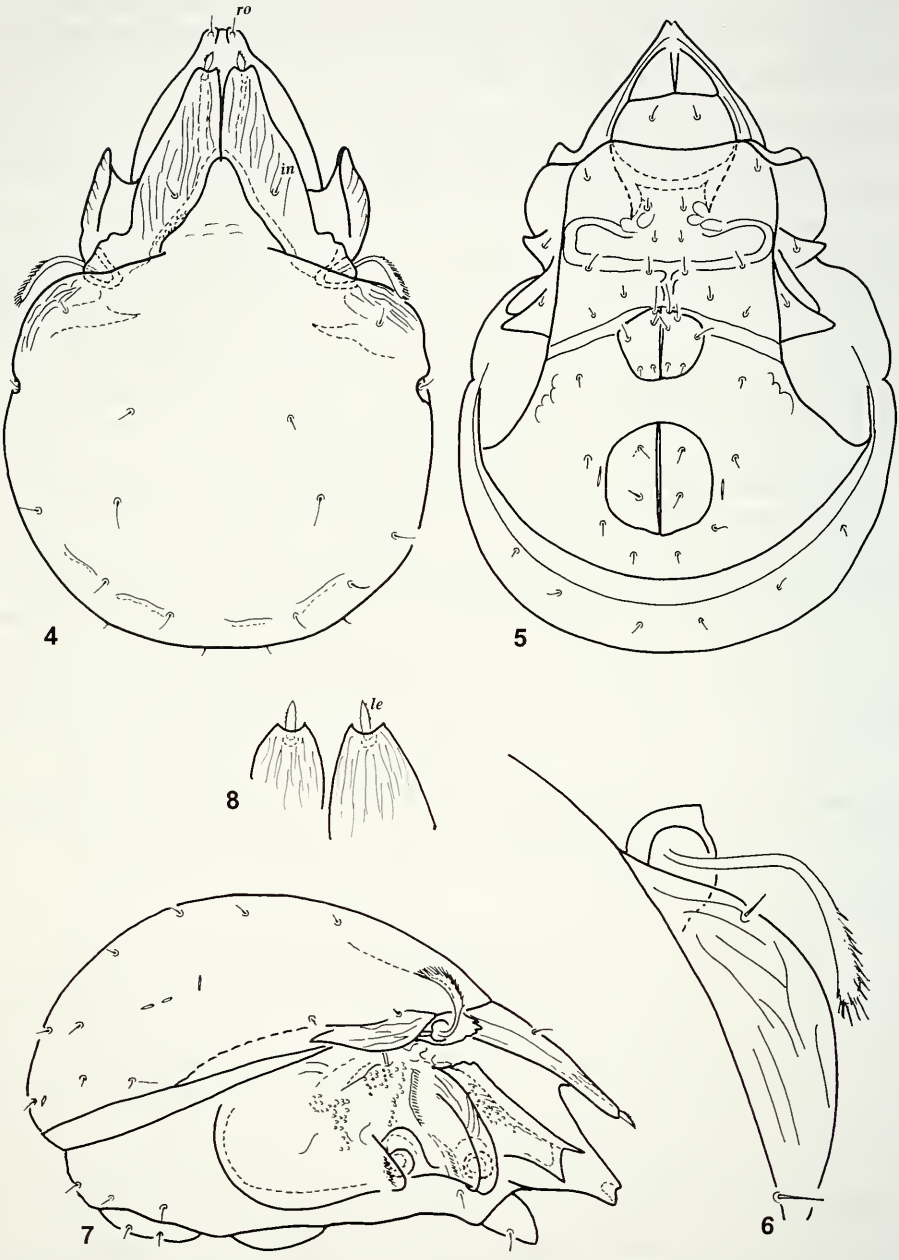
1a Outer cusps of lamellae four to five times longer than the inner cusps 2
1b Both lamellar cusp nearly equal in length 3
2a Head of sensillus long, with spinifom distal end . . . . . *hurkai* Kunst, 1958
2b Head of sensillus rounded distally . . . . . *discrepans* Mahunka, 1966
3a Distal end of lamellae wide, lamellar setae located in the middle . . . . . *similis* Subías & Iturrondobeitia, 1978
3b Distal end of lamellae narrowed, lamellar setae located laterally . . . . . *senensis* Bernini, 1975

Family Nosybeidae Mahunka, 1993

Lamellocepheus personatus (Berlese, 1910) Figs 9-14, 19

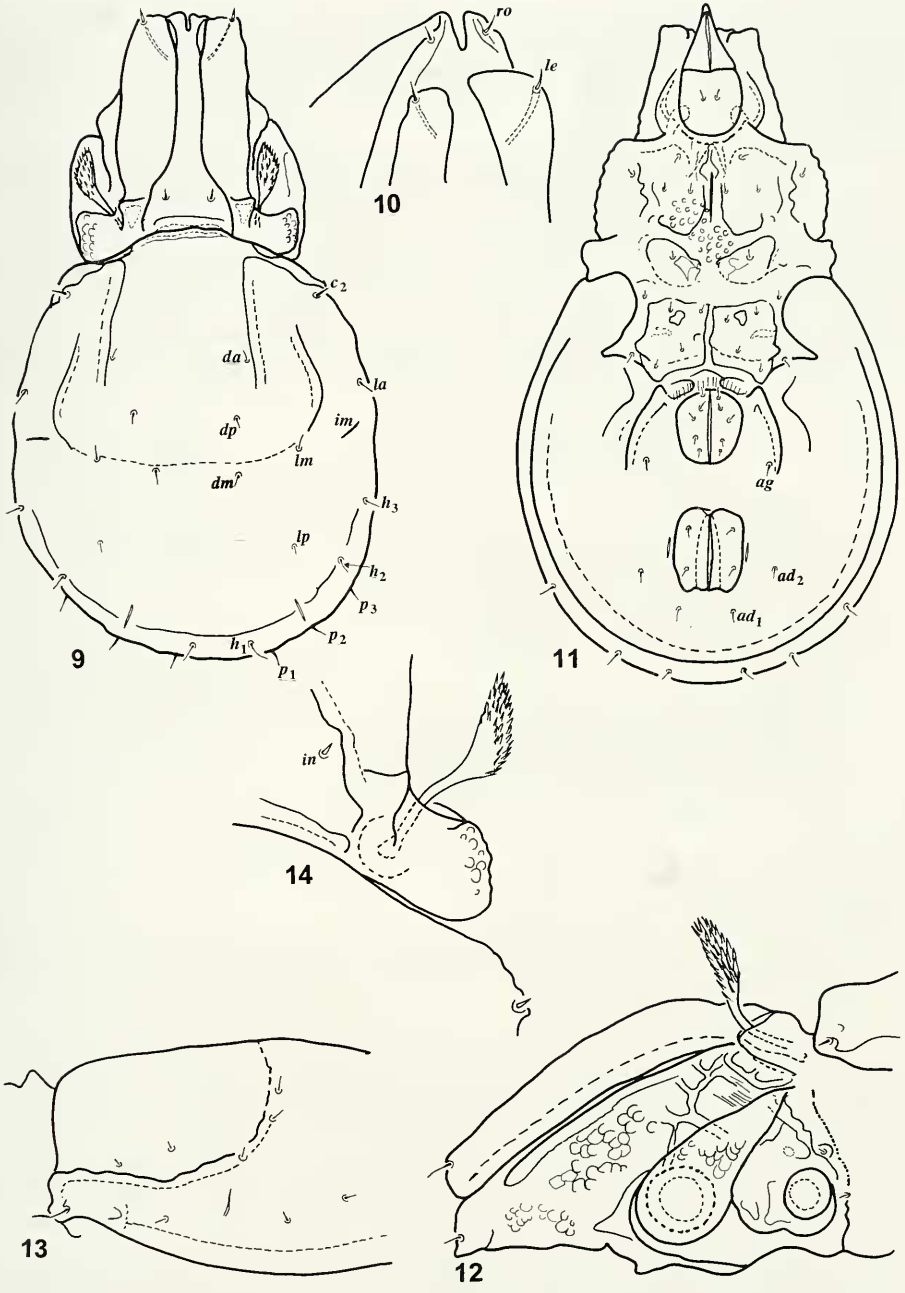
Localities: **VS-40**: Switzerland: Valais: above Vernayaz, 700 m; 7.X.1980; leg. C. Besuchet (221). – **TI-42**: Switzerland: Ticino: Cortascio above Brissago, sifting of mosses, 900 m; 20.V.1998; leg. C. Besuchet (229).

Remarks: This species was studied and redescribed by Weigmann & Murvanidze (2003) on the basis of Georgian specimens. They gave a thorough histori-



FIGS 4-8

Miracarus similis Subías & Iturrondobeitia, 1978. (4) Body in dorsal view. (5) Body in ventral view. (6) Sensillus and pteromorpha. (7) Body in lateral view. (8) Lamellar cusps.



FIGS 9-14

Lamellocepheus personatus (Berlese, 1910). (9) Body in dorsal view. (10) Rostral apex. (11) Body in ventral view. (12) Podosoma in lateral view. (13) Anterior part of notogaster. (14) Trichobothrium.

cal survey of the morphological and nomenclatural problems of the genus and species. The species, now also known from Switzerland, has been found in the Mediterranean region, particularly at alpine localities. These specimens are easily identifiable with the description and figures published by Weigmann and Murvanidze (*cf.* our Figs 9-14 made from the Swiss specimens,).

The present study gave us the opportunity to review the taxa belonging to the genera *Lamellocepheus* Balogh, 1961 and *Nosybea* Mahunka, 1993. Soon after the publication of the paper of Weigmann and Murvanidze (2003), Subías (2004) accepted the validity of the family *Nosybeidae*, but synonymised the two genera, without having studied their types. A fairly recent study and the re-examination of the type specimens of *Nosybea genavensis* Mahunka, 1993 and *Lamellocepheus personatus* by Mahunka (1993) clearly show that Subías made a mistake, so the validity of the genus name *Nosybea* is herewith re-established.

Distinction between *Lamellocepheus* and *Nosybea*

Lamellocepheus

1. Middle of anterior half of notogaster with a U-shaped, undivided suture.
2. Epimeral region without annulate structure.
3. A pair of ridges along the genital aperture.
4. Five pairs of genital setae present.

Nosybea

1. Anterior part of notogaster in the middle with a longitudinal crest.
2. Epimeral region with 12 robust structures.
3. No pairs of ridges along the genital aperture.
4. Four pairs of genital setae present.

Family Ceratozetidae Jacot, 1925

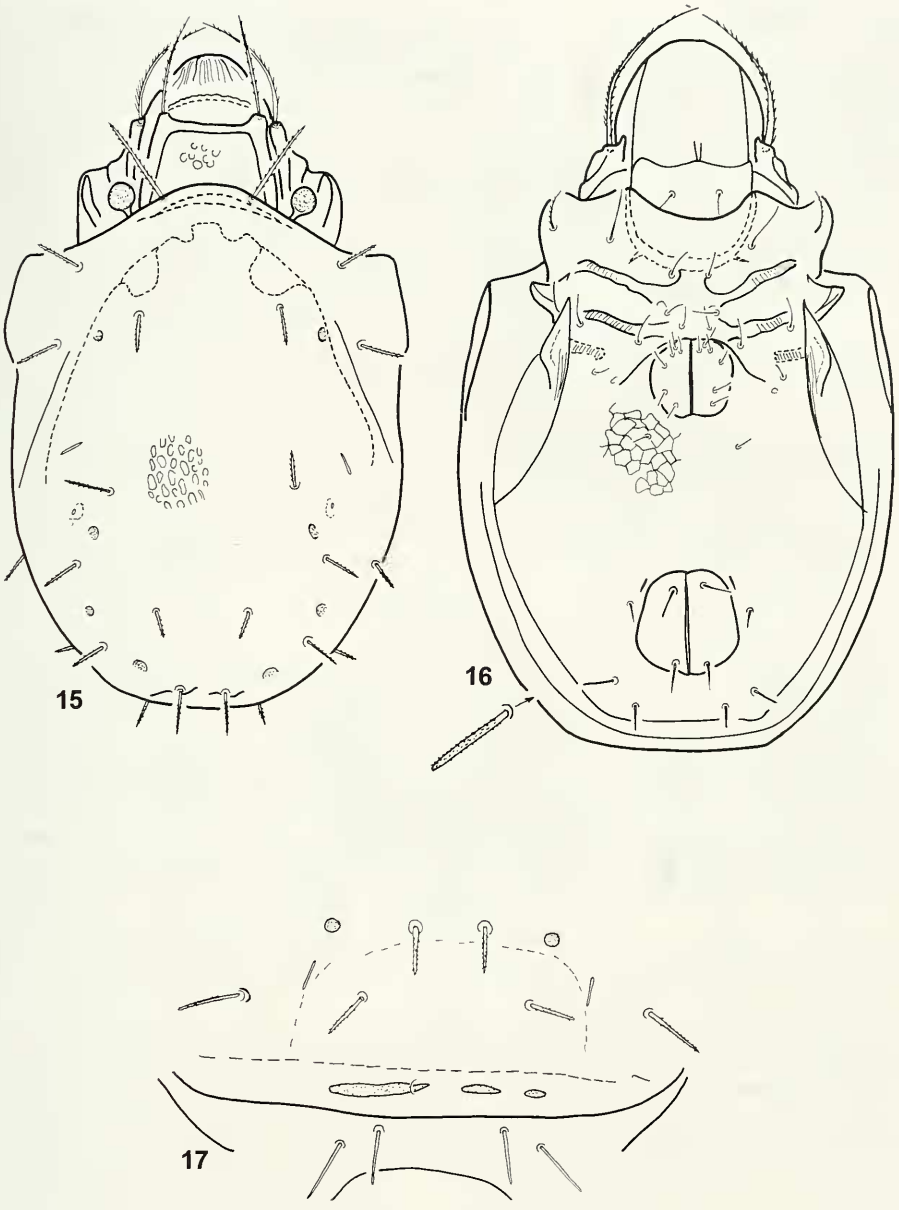
Jugatala angulata (C. L. Koch, 1839) Figs 15-18

Material examined: **VS-44**: Switzerland: Valais: Saas-Almagell, waterlogged mosses, 1650 m; 5.VII.1997; leg. C. Besuchet (225).

Measurements: Length of body: 505-520 μm, width of body: 351-363 μm.

Description: *Prodorsum*: Rostrum rounded, without rostral apex. Surface of rostral part striated longitudinally. Other parts of surface polygonate. A distinct transversal, arched lath present in front of the lamellae. Lamellar complex well developed, wide, typical for this genus. Lamellae and translamella nearly equal in width, lamellar setae arising on distinct lamellar cusps. Interlamellar setae strong, straight, distinctly pilose. Bothridium cup-shaped, covered by dorsosejugal tectum. Sensillus short, rounded in dorsal view, hemispherical in lateral view, its surface finely aciculate.

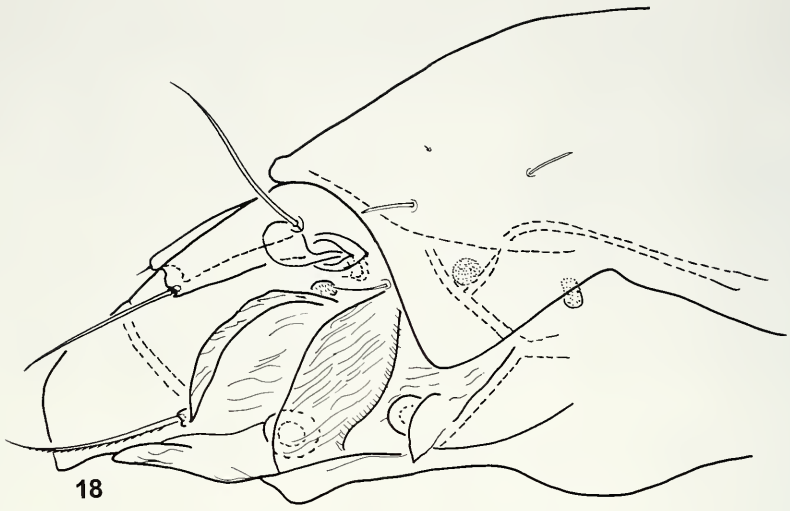
Notogaster: Dorsosejugal suture distinct, strongly convex, whole surface with distinct polygonate ornamentation. Pteromorphae small, triangular, a hinge line partly observable. Eleven pairs of short, mostly bacilliform, dark notogastral setae present, all finely barbed. Four pairs of small and round porose areas and 5 pairs of lyrifissures present. All porose areas nearly equal in length.

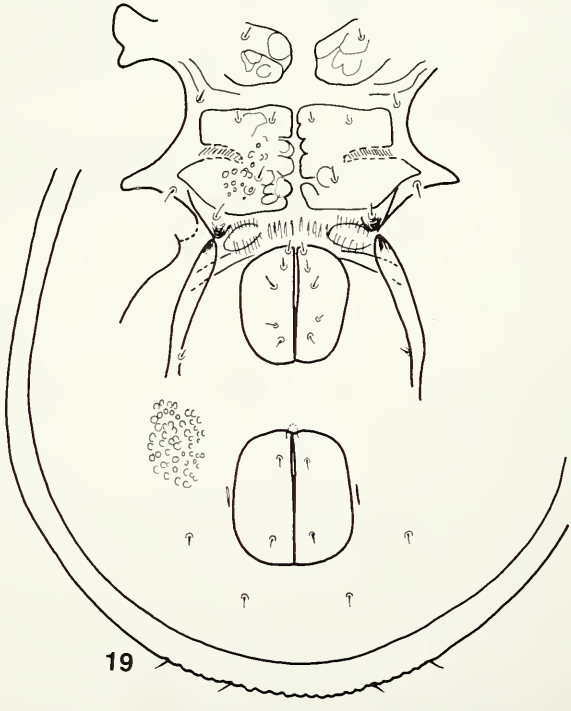


FIGS 15-17

Jugatala angulata (C. L. Koch, 1839). (15) Body in dorsal view. (16) Body in ventral view. (17) Posteromarginal part of notogaster.

Lateral part of podosoma: Genal tooth wide, elongate. Tutorium narrow, striate, conspicuously arched ventrally, with small apex. Rostral setae arising on rostral surface. Pedotectum I large, wide, distinctly striate. Pedotecta II-III covering posterior





FIGS 18-19
(18) *Jugatala angulata* (C. L. Koch, 1839), lateral part of podosoma. (19) *Lamellocepheus personatus* (Berlese, 1910), ventral plate and posterior part of epimeral region.

half of acetabulum. Three humerosejugal porose areas present. Sublamellar porose area distinctly visible. Circumpedal carina present.

Ventral regions: Apodemes 2 and *ap. sej.* connected medially. Surface of infracapitulum smooth, epimeres and genital plate with very fine striation. Ventral and anal plate with polygonate sculpture. All epimeral setae thin, setiform, finely barbed. Custodian short, discidium large. Genito-anal setal formula: 6-1-2-3, anterior 3 pairs arising close to each other, along the anterior margin. Genital, aggenital and anal setae thin, simple, setiform, except for the anterior adanal setae ad_3; all other setae bacilliform, barbed, like the notogastral setae. Lyrifissures *iad* located at anterior corner of anal plates. Postanal porose area narrow, divided into 2-4 small parts.

Legs: All legs tridactylous, with equally large claws.

Remarks: The type species of the genus *Jugatala* Ewing, 1913 is *J. tuberosa* Ewing, 1913. Sellnick (1928, 1960) transferred the species *Oribata angulata* C.L. Koch, 1939 to this genus. The position of the genus *Jugatala* was several times misinterpreted by different authors, so at times it was placed in the families Ceratozetidae and Mycobatidae. Having studied immature specimens, Behan-Pelletier (2000) placed *Jugatala* in the family Ceratozetidae. On the other hand, Subías (2004, 2008) ranged *angulata* again in the subgenus *Calyprozetes* Thor, 1930 of the genus *Mycobates* in the family of Mycobatidae, although *Jugatala tuberosa* was placed by him in the family Ceratozetidae.

This latter point of view obviously needs to be revised. Although Behan-Pelletier (2000) redescribed the type species, he did not deal with *J. angulata*, neither did Subías carry out a new study. On the basis of our recent study of the Swiss specimens, we state that *angulata* belongs in the genus *Jugatala*, and we accept the conclusions of Behan-Pelletier that this genus belongs in the family Ceratozetidae. We cannot deal with the other described species. *J.* (?) *rotunda* Willmann, 1953, described from Europe, is possibly a member of the genus *Jugatala*, but this supposition needs confirmation as noted by Willmann himself in 1953. A part of the species listed by Subías may not be members of the genus *Jugatala*, but rather of *Calyptozetes*. Of course, the taxonomic position of that genus is dubious.

On the basis of the Swiss specimens examined we can provide the complementary description given above.

Jugatala angulata is well distinguished from the type species of the genus by the form of the body, by the form of the notogastral setae and, most importantly, by the number and form of the porose areas of the notogaster. The only specimen of this species previously known from Switzerland was collected by Schweizer (1948) in the canton of Graubünden. A recent redescription of this species was given by Bayartogtokh & Schatz (2008).

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